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Magnetic field effects dynamics of ethylammonium nitrate ionic liquid confined between glass plates

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Abstract

© 2018 the Owner Societies. Self-diffusion and NMR relaxation of the ethylammonium (EA) cation were studied in the protic ionic liquid, ethylammonium nitrate (EAN), confined between polar glass plates separated by a few μm distance and exposed to an external magnetic field of 9.4 T. The diffusion coefficient of EA (D) and the transverse NMR relaxation rate (1/T2) of -NH3protons were increased immediately after placing the sample in the magnetic field by factors of ~2 and ~22, respectively, in comparison with those of bulk EAN. Further exposure of the sample to the magnetic field led to gradual changes in D, T1and T2towards their bulk values with a time constant of ~70 min. Complete "recovery" of the sample to the "accelerated" D and "shortened" T2values occurred at longer than 24 hours after the removal of the EAN sample from the magnet. Because the observed characteristic times of the change far exceed the times of molecular processes in EAN, we suggested that this phenomenon is related to reversible phase transformations occurring in confined EAN.

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